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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ANYA, CHARLES E

ART UNIT	PAPER NUMBER
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2126

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

09/588,006

Applicant(s)

CAYTON ET AL.

Examin r

Charles E Anya

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1 – 5, 8 – 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,591,310 B1 to Johnson in view of U.S. Pat. No. 6,545,981 B1 to Garcia et al.**

3. As to claim 1, Johnson teaches the invention substantially as claimed including a split model network driver (Figure 1 Col. 7 Ln. 31 – 39) comprising: a host module driver provided on a host (“...host-based driver...” Col. 6 Ln. 29 – 56, OSM 12 Col. 7 Ln. 31 – 39, Col. 15 Ln. 45 – 67, Host Driver 70, 80 Col. 13 Ln. 35 – 67), the host connected to a switched fabric (Fibre Channel Col. 6 Ln. 6 Ln. 29 – 55), an 110 unit module driver on a remote 110 unit (HDM 14 Col. 7 Ln. 31 – 39, DDM Col. 15 Ln. 45 – 67, Col. 16 Ln. 1 – 10, “...peripheral...” Col. 12 Ln. 59 - 65), the I/O unit connected to the switched fabric (“...Fibre Channel...” Col. 6 Ln. 29 – 56, Col. 13 Ln. 1 – 19), wherein both the host module driver and the 110 unit module driver include a push-push messaging layer to

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communicate messages across the switched fabric (“...message passing medium...”

Col. 6 Ln. 29 – 56, Col. 12 Ln. 66 – 67, Col. 13 Ln. 1 – 19).

Although, Johnson teaches the messaging passing medium to include a request and reply descriptor (Col. 13 Ln. 35 – 45) he does not explicitly show RDMA writes.

Garcia teaches RDMA writes and message Send (“...Send...RDMA Write...” Col. 3 Ln. 62 – 67). It would have been obvious to apply the teaching of Garcia to the system of Johnson. One would have been motivated to make such a modification in order to provide a transaction type that has a 32 bit Immediate data field or 64 bit Virtual address that may follow the VI ID number (Col. 4 Ln. 1 – 6).

4. As to claim 2, Johnson teaches the host and the I/O unit each includes a virtual interface (VI) work queue pair queues (Request Post FIFO 75, Reply Post FIFO 77, 87 Col. 13 Ln. 63 – 67, Col. 14 Ln. 1 – 54, Col. 15 Ln. 1 – 67, Col. 16 Ln. 1 – 67).

5. As to claim 3, Johnson teaches the VI work queue pair as comprising a send and a receive queue (Request Post FIFO 75, Reply Post FIFO 77, 87 Col. 13 Ln. 63 – 67, Col. 14 Ln. 1 – 54, Col. 15 Ln. 1 – 67, Col. 16 Ln. 1 – 67).

6. As to claim 4, Johnson teaches both the host module driver and the 110 unit module driver include a push-push messaging layer to communicate messages across the switched fabric using message Sends and RDMA writes (“...Fibre Channel...” Col. 6 Ln. 29 – 56, Col. 13 Ln. 1 – 19).

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Johnson is silent with reference to the RDMA write that includes data and a transfer indication to identify a buffer consumed at a destination.

Garcia teaches the RDMA write that includes data and a transfer indication to identify a buffer consumed at a destination (“...control information...immediate data...” Col. 3 Ln. 62 – 67, Col. 4 Ln. 1 – 6).

7. As to claim 5, Garcia further teaches the transfer indication is provided as immediate data in the RDMA write (“...control information...immediate data...” Col. 3 Ln. 62 – 67, Col. 4 Ln. 1 – 6).

8. As to claim 8, Johnson teaches an apparatus comprising: a first virtual interface (VI) work queue pair; a second virtual interface (VI) work queue pair (Request Post FIFO 75, Reply Post FIFO 77, 87 Col. 13 Ln. 63 – 67, Col. 14 Ln. 1 – 54, Col. 15 Ln. 1 – 67, Col. 16 Ln. 1 – 67), a messaging layer to communicate buffer management messages over the switched fabric using the first work queue pair, and to communicate messages over the switched fabric using the second VI work queue pair, one or more of the messages including a transfer indication within the message that identifies a buffer consumed by the messages (“...message passing medium...” Col. 6 Ln. 29 – 56, Col. 12 Ln. 66 – 67, Col. 13 Ln. 1 – 19).

The Johnson reference does not explicitly teach a channel adapter that is couple to the send and receive queues however, this limitation is inherently taught since Johnson

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teaches a Fibre Channel Network that includes channel adapter for sending and receiving messages to/from an I/O device(s) (Col. 4 Ln. 31 – 55).

Johnson is silent with reference to communicating RDMA writes over switched fabric.

Garcia teaches communicating RDMA writes over switched fabric (“...Send...RDMA Write...” Col. 3 Ln. 62 – 67). It would have been obvious to apply the teaching of Garcia to the system of Johnson. One would have been motivated to make such a modification in order to provide a transaction type that has a 32 bit Immediate data field or 64 bit Virtual address that may follow the VI ID number (Col. 4 Ln. 1 – 6).

9. As to claims 9, Johnson teaches the apparatus to include a host unit (Host Platform 20 Col. 7 Ln. 40 – 43).

10. As to claim 10, Johnson teaches the apparatus to include an I/O unit (HDM 14 Col. 7 Ln. 31 – 39, DDM Col. 15 Ln. 45 – 67, Col. 16 Ln. 1 – 10, “...peripheral...” Col. 12 Ln. 59 - 65).

11. As to claim 11, Johnson teaches the messaging layer as a push-push messaging layer (“...message passing medium...” Col. 6 Ln. 29 – 56, Col. 12 Ln. 66 – 67, Col. 13 Ln. 1 – 19).

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12. As to claim 13, Garcia teaches the RDMA write that includes data and a transfer indication to identify a buffer consumed at a destination ("...control information...immediate data..." Col. 3 Ln. 62 – 67, Col. 4 Ln. 1 – 6).

13. **Claims 19 and 20 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,591,310 B1 to Johnson in view of U.S. Pat. No. 6,545,981 B1 to Garcia et al. as applied to claim 1 above, and further in view of U.S. Pat. No. 4,503,499 to Mason et al.**

14. As to claim 19, Johnson as modified by Garcia teaches a method comprising: establishing a connected channel between first and second nodes across a switched fabric by associating a work queue pair of the first node with a work queue pair of the second node, the RDMA write also including a transfer indication identifying the buffer at the second node that received the data (see claim 1).

Johnson as modified Garcia is silent with reference to for communicating data from a first node to a pre-registered buffer of a second node.

Mason teaches communicating data from a first node to a pre-registered buffer of a second node ("...assigned..." Col. 13 Ln. 9 – 16). It would have been obvious to apply the teaching of Mason to the system of Johnson as modified. One would have been motivated to make such a modification in order to reduce the latency time for event packet retrieval.

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15. As to claim 20, Garcia further teaches the transfer indication is provided as immediate data in the RDMA write (“...control information...immediate data...” Col. 3 Ln. 62 – 67, Col. 4 Ln. 1 – 6).

16. As to claim 21, Johnson as modified teaches establishing a second connected channel between the first and second nodes, the second channel to communicate control and buffer management messages between the nodes (“...data...” Col. 6 Ln. 64 – 67, Col. 7 Ln. 1 – 10).

17. As to claim 22, Johnson as modified by Garcia teaches a method comprising: establishing a connected channel between first and second nodes across a switched fabric by associating a work queue pair of the first node with a work queue pair of the second node, the RDMA write also including a transfer indication identifying the buffer at the second node that received the data (see claim 1).

Johnson as modified Garcia is silent with reference to for communicating data from a first node to a pre-registered buffer of a second node.

Mason teaches communicating data from a first node to a pre-registered buffer of a second node (“...assigned...” Col. 13 Ln. 9 – 16). It would have been obvious to apply the teaching of Mason to the system of Johnson as modified. One would have been motivated to make such a modification in order to reduce the latency time for event packet retrieval.

18. Claims 6,7,12 and 14 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,591,310 B1 to Johnson in view of U.S. Pat. No. 6,545,981 B1 to Garcia et al. as applied to claim 1 above, and further in view of U.S. Pat. No. 6,370,605 B1 to Chong Jr.

19. As to claim 6, Johnson teaches the messaging layers of the host module driver and I/O unit module driver that communicate configuration messages (Config request message 140 Col. 16 Ln. 61 – 67) and communicate data (“...MessageControl field value...” Col. 14 Ln. 55 – 67, “...Address or Context...” Col. 16 Ln. 29 – 40).

Johnson is silent with respect to having different channels for communicating control and configuration messages, and data.

Chong teaches different channels for communicating control and configuration messages, and data (Links 271 – 273, Links 251 and 252 Col. 6 Ln. 36 – 67, Col. 7 Ln. 66 – 67, Col. 8 Ln. 1 – 37). It would have been obvious to apply the teaching of Chong to the system of Johnson as modified. One would have been motivated to make such a modification to improve scalability (Col. 8 Ln. 19 – 26).

20. As to claim 7, Johnson as modified by Chong teaches the split model network driver to include the messaging layers of the host module driver and the I/O unit module driver communicate buffer management messages over a first channel and communicate data over a second channel (“...data...” Col. 6 Ln. 64 – 67, Col. 7 Ln. 1 – 10).

21. As to claim 12, Johnson as modified by Chong teaches the messaging layer as provided to communicate buffer management messages over a first channel using the first work queue pair, and to communicate RDMA write messages over a second channel using the second VI work queue pair (“...data...” Col. 6 Ln. 64 – 67, Col. 7 Ln. 1 – 10).

22. As to claim 14, Johnson teaches a virtual interface (VI) work queue (Request Post FIFO 75, Reply Post FIFO 77, 87 Col. 13 Ln. 63 – 67, Col. 14 Ln. 1 – 54, Col. 15 Ln. 1 – 67, Col. 16 Ln. 1 – 67), a push-push messaging layer to communicate control and buffer management messages over a first channel and to communicate RDMA write messages over a second channel, one or more of the RDMA write messages including a transfer indication within the RDMA write message, the transfer indication identifying a buffer that is consumed at a destination by a RDMA write (“...data...” Col. 6 Ln. 64 – 67, Col. 7 Ln. 1 – 10. Also see the rejection of claim 6).

Johnson does not explicitly teach a host channel adapter coupled to the VI work queue, the channel adapter to interface the host to a switched fabric, however, this limitation is inherently taught since Johnson teaches a Fibre Channel Network that includes channel adapter for sending and receiving messages to/from an I/O device(s) (Col. 4 Ln. 31 – 55).

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23. As to claim 15, Johnson reference does not explicitly teach the apparatus as comprising a host and the channel adapter to include a host channel adapter, however, this limitation is inherently taught since Johnson teaches a Fibre Channel Network that includes channel adapter for sending and receiving messages to/from an I/O device(s) (Col. 4 Ln. 31 – 55).

24. As to claim 16, The Johnson reference does not explicitly teach the apparatus comprising an I/O unit and the channel adapter to include a target channel adapter, however, this limitation is inherently taught since Johnson teaches a Fibre Channel Network that includes channel adapter for sending and receiving messages to/from an I/O device(s) (Col. 4 Ln. 31 – 55).

25. As to claim 17, Johnson as modified is silent with respect the apparatus further comprising a network interface controller (NIC) to interface the 110 unit to another network, the control channel being used by the messaging layer of the 110 unit to receive NIC configuration messages received across the switched fabric.

Garcia teaches the apparatus to further include a network interface controller (NIC) to interface the 110 unit to another network, the control channel being used by the messaging layer of the 110 unit to receive NIC configuration messages received across the switched fabric (“...NIC end node...” Col. 3 Ln. 36 – 45).

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26. As to claim 18, Johnson teaches a virtual interface (VI) work queue (Request Post FIFO 75, Reply Post FIFO 77, 87 Col. 13 Ln. 63 – 67, Col. 14 Ln. 1 – 54, Col. 15 Ln. 1 – 67, Col. 16 Ln. 1 – 67), a push-push messaging layer to communicate control and buffer management messages over a first channel and to communicate RDMA write messages over a second channel, one or more of the RDMA write messages including a transfer indication within the RDMA write message, the transfer indication identifying a buffer that is consumed at a destination by a RDMA write (“...data...” Col. 6 Ln. 64 – 67, Col. 7 Ln. 1 – 10. Also see the rejection of claim 6).

Johnson does not explicitly teach a host channel adapter coupled to the VI work queue, the channel adapter to interface the host to a switched fabric, however, this limitation is inherently taught since Johnson teaches a Fibre Channel Network that includes channel adapter for sending and receiving messages to/from an I/O device(s) (Col. 4 Ln. 31 – 55).

Response to Arguments

27. Applicant's arguments with respect to claims 19 – 22 have been considered but are moot in view of the new ground(s) of rejection.

28. Applicant's arguments filed 11/17/03 have been fully considered but they are not persuasive (Referring to claims 1 – 18).

Applicant argues that neither the Johnson nor the Garcia prior art references teaches a push-push messaging protocol.

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Firstly, the references used in this office action should not be taken in isolation of each other but rather should be taken in combination. The push-push messaging protocol **as claimed** requires a push-push messaging layer to communicate messages across a switched fabric using message Sends and RDMA writes to a destination buffer. The Johnson reference is switch fabric that includes a messaging layer for sending and receiving messaging between a host computer and an I/O unit buffers. However, Johnson is deficit with respect to using message RDMA writes. The Garcia reference overcomes this deficiency by providing a switch fabric that implements Sends and RDMA writes between host computers and I/O units. Thus, when taken **in combination** the Johnson and Garcia references cover the invention **as claimed**.

Applicant also argues that the Chong prior art reference does not teach “a messaging layer to communicate buffer management messages over the switched fabric using the first work queue pair” and that Chong does not teach using control channel to communicate buffer management messages.

Again the references used in this office action should not be taken in isolation, the combination of the references are used for the rejection. As for not teaching control channel to communicate buffer management messages, the Chong is a switch fabric that communicates **control information** over multiple links between host computers and storage devices (Column 6 Lines 36 – 67). The control information includes **command and status** signal that could be used for system configuration.

Conclusion

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29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. No. 4,674,033 to Miller.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles E Anya whose telephone number is (703) 305-3411. The examiner can normally be reached on M-F (8:30-6:00) First Friday off.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Charles E Anya
Examiner
Art Unit 2126



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